

SANS

Spaceflight Associated Neuro-ocular Syndrome



70% Incidence

Space Station astronauts experience some amount of swelling in the back of the eye.

What is it?

Eye and brain changes during long-duration spaceflight

Most astronauts' eyes and brain structure change in space. The long-term health consequences are unknown, but are currently being monitored and investigated.

What is causing it?

Headward fluid shifts that occur in weightlessness

Weightlessness causes blood and cerebrospinal fluid to shift toward the head. This fluid shift is believed to be the underlying cause of the eye and brain structural changes.



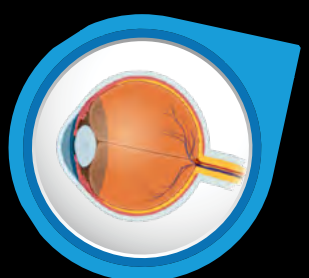
Brain Structural Change

- Ventricular volume enlargement
- Upward shift of brain
- Pituitary gland shape changes



Cerebrospinal Fluid Shift

Upward redistribution of fluid around the brain



Eye Changes

- Swelling of the nerve as it enters the eye
- Folds develop in retina
- Back of eye flattens
- Vision becomes blurry



Venous Blood Shift

Weightlessness causes blood in veins to shift toward head and eye

Mission Impact

Long-duration astronauts may experience some or all of these changes; there is biological variation. Vision changes may impact an astronaut's inflight performance. The longer they are in space, the more they may be impacted. Many astronauts only experience effects in space, but some changes may be permanent in some astronauts. Researchers are studying ways, including fluid shift countermeasures, to prevent SANS during spaceflight and determine any long-term health effects in astronauts.